

Q&A May webinar Human Centric Lighting

- What is the latest research information on ipRGC relating to HCL?
The white paper of Luc Schlangen on the effect of light on our sleep/wake cycle:
http://www.lighting.philips.com/b-dam/b2b-li/en_AA/Experience/Topics/Education/Lighting_Academy/how-to-beat/Daily-sleep-wake-cycles-whitepaper-FINAL.pdf
- For Outdoor lighting, we have several cities/designers now challenging LEDs and color temperature. Do you have any white papers on the subject promoting or disputing the use of any specific color temperature?
Human centric lighting is focused on indoor illumination. Outdoor illumination is there when it is dark, related with mesopic vision where the eye is sensitive to dimmed levels. Also the demands for what you need to see outdoor is different than indoor. Having said that, light during the evening hampers the fall asleep process, and especially the blue wavelengths. So in that sense the huge billboards on the building facades can play a negative role in the sleep-wake cycle.
- What lux level is good for reading?
Reading is a near-by visual task that needs accommodation of the eye. Studies demonstrate that people can read faster and experience less eyestrain under 1000 lux and 6000 K. However, other user experience demonstrates that if you give people over 45 years old the ability to choose color temperature and intensity a wide palette of choices. The recommendation is therefore to offer flexibility in choices depending on the person and task at hand to reach high satisfaction levels as each person is unique and each eye is unique.
- What about the elderlies?
Elderlies do live in a virtual darkness and they need more diffuse indirect illumination with low luminance contrast and guidance light (light for safely navigating from one area to another). This will help them a lot in their perception of vitality, reducing falls, and sleep-wake cycle. This is quite consistent literature
- Are there any studies on the effects of using 6,500°K into schools or office environments?
Yes, the combination of 800-1000 lux/6000 K delivers a benefit in concentration levels and literacy scores (Slegers, LR&T, 2012)
- How does the Glare and low lux (below 100lux) affect student's performance?
I am not aware of studies that measures the effects of direct glare, discomfort glare on student performance. There are studies though that poor visual ergonomic conditions (which is caused by e.g. direct glare or discomfort glare) can cause eyestrain and neck and back pains and as such hampers the individual performance. Richter's group in Norway does nice work in this context. Also the effect of light intensity on reading speed and detailed vision is extensively studied. Generally high intensity will lead to faster reading speeds up to saturation level and can enhance concentration for repetitive tasks (Steidle for instance)
- How to balance costs and need for HCL in current systems?
The challenge of today is to create energy efficient environments while energizing people. LED and connected technology allows for energy efficient solutions while simultaneously creating energized environments. The economic value of human centric lighting comes back in the employee productivity increase.

- Do you know studies around the evaluation of public lighting services; focusing on the needs of users (pedestrians and drivers)?

Human centric lighting as presented in this webinar is focused on indoor illumination, but it encompasses lighting for people regardless of indoor or outdoor/public spaces. Outdoor illumination is there when it is dark, related to mesopic vision where the eye is sensitive to dimmed levels. Parameters such as safety and vision are key in this domain.

- Is the acute system third receptors also adjusting the cones and rods in eye, or what works as our sensors for adopting to light levels?

First studies are suggesting that there might be a relationship also between the third receptors and cones and rods in the eye. This might explain some inconsistency in the literature on alertness measurements for instance. The visual performance and sleep-wake cycle is well described and investigated. The mechanisms how light affects acute effects and visual experience are still for a great deal unknown.

- The Karolinksa example seems to show far higher lux levels in the improved setting; this seems to be a trade off with the energy cost; facility managers will discourage higher lux levels and ignore the potential improvement in productivity and well-being. *Not really a question, but maybe you would like to comment on it anyway.*

Thank you for the question. Actually due to the change in LED and censoring an energy saving as compared to T8 was realized while simultaneously creating an energizing environment. People felt more alert and less stressed indicating an improved sense of wellbeing. Wellbeing is essential in the long run for work place health and hence organizational productivity. The value of 1% productivity is 5 to 10 higher than what can be achieved a further reduction in energy. Having said that I recognize the strong emphasize on being cost-sensitive and rather a trend to lower the lux levels. I expect though a change in the coming years when recommendations come out on non-visual lighting and WELL certification of building.